REMARKS

Reconsideration and allowance of this application are respectfully requested in light of the above amendments and the following remarks.

Claims 20, 29, 30, 34 and 35 stand rejected under 35 USC 103 (a) as unpatentable over Ikeda et al. (US 2002/0058493) (it is noted that the Final Rejection contains a typographical error in citing US 2002/0058593 in Sections 5, 6 and 7 although the PTO-892 contains the correct citation) in view of Khan et al. (US 2002/0064167). Claims 21-24 and 31-33 stand rejected under 35 USC 103 (a) as unpatentable over Ikeda et al. (US 2002/0058593) in view of Khan et al. (US 2002/0064167) and Hershey (US 6,662,330). Claims 25-28, 36 and 37 stand rejected under 35 USC 103 (a) as unpatentable over Ikeda et al. (US 2002/0058593) in view of Khan et al. (US 2002/0064167) and Whitehill et al. (US 2002/0191573). To the extent that these rejections may be deemed applicable to the amended claims presented herein, the Applicants respectfully traverse in accordance with the points set forth below.

Amended claim 20 defines:

A base station apparatus using an automatic repeat request (ARQ) procedure, said base station apparatus comprising:

a reception unit configured to receive data from a terminal apparatus in an uplink;

an error detection unit configured to perform an error detection for the data by using an error-detecting code; and

a transmission unit configured to transmit, to the terminal apparatus:

(i) an acknowledgment (ACK) signal when said error detection unit detects no error;

(ii) a negative acknowledgement (NACK) signal when said error detection unit detects an error; and

(iii) a control signal, <u>which is a different signal from the ACK signal and the NACK signal</u>, pairing with the ACK signal or the NACK signal, for governing operations, which are performed in the terminal apparatus, including a new transmission, a retransmission, and no transmission <u>of a new transmission and a retransmission</u>. (Emphasis added.)

The Office Action cites paragraphs [0004], [0005], [0015], [0020] and [0064] of Ikeda et

al. as disclosing a control signal pairing with an ACK signal or a NACK signal; however, these paragraphs merely disclose:

> [0004] Conventionally, a method of sending acknowledgment is usually adopted as a retransmission control method in communication systems. In this method, when a receiver receives a signal which is sent from a sender, the receiver judges whether the signal is correctly received, that is, whether the signal includes an error. When the signal is correctly received, the receiver sends ACK (acknowledgement) which indicates that retransmission is unnecessary to the sender. When the signal is not correctly received, the receiver sends NACK (negative acknowledgement) for requesting retransmission to the sender. When the sender receives NACK, the sender retransmits a signal corresponding to the previously transmitted signal.
>
> [0005] This retransmission control method is also adopted in a communication system in which mobile stations and base stations communicate each other via communication channels. For example, as far as retransmission control for a signal sent from a mobile station to a base station (which will be called an up-link signal hereinafter) is considered, an mobile station which plays a role of a sender sends a signal to a corresponding base station with which the mobile station communicates, that is, a communication partner of the mobile station. The base station performs error judgment for the received up-link signal. When there is an error in the received signal, the base station sends NACK to the mobile station. On the other hand, when there is not any error, the base station sends ACK to the mobile station. When the mobile station receives NACK, the mobile station retransmits a corresponding up-link signal.
>
> [0015] According to this retransmission control method, every base station which received the up-link packet from the mobile station performs error judgment, and, when at least one base station judges that there is no error, ACK signal which indicates that retransmission is not required is sent to a mobile station by the corresponding base station. Therefore, retransmission process is reduced maximally so that effective retransmission control becomes possible. As a result, load of retransmission process can be reduced and communication channels can be used effectively.
>
> [0020] a corresponding base station sending a response which indicates that retransmission is not required to the mobile station when at least one result from the base stations indicates there is no error; and
>
> [0064] In the same way as the first embodiment, when the table includes the result of error judgment indicating the received up-link signal includes no error, the base station sends ACK to the mobile station. The mobile station which receives ACK does not retransmit the signal. On the other hand, when the table does not include the result of error judgment indicating no error, that is, when every result of error judgment indicates that the received up-link signal includes an error, the base station sends NACK to the

mobile station. The mobile station which receives NACK retransmits the signal.

It is apparent that these cited paragraphs of Ikeda et al. fail to teach or suggest the features of the herein amended claims 20, 30, 34 and 35 of a control signal, which is a different signal from the ACK signal and the NACK signal, pairing with the ACK signal or the NACK signal, for governing operations, which are performed in the terminal apparatus, including a new transmission, a retransmission, and no transmission of a new transmission and a retransmission.

The Final rejection acknowledges that Ikeda et al. fail to disclose a control signal that governs operations including a new transmission.

For this subject matter of a control signal that governs operations including a new transmission, the Final Rejection cites Khan et al. at the Abstract and paragraphs [0010] and [0017]. However, these portions of Khan et al. merely disclose:

> Abstract. Disclosed is an ARQ technique that efficiently utilizes channel resources while allowing for scheduling flexibility. The ARQ technique is an asynchronous parallel packet transmission technique which utilizes packet identifiers, sequence identifiers and user identifiers. The ARQ technique does not require a strict timing relationship to exist between parallel channels and physical layer frames because the identifiers would indicate to the user the user to whom a sub-packet is intended, the identity of the sub-packet and the sequence of the sub-packet.
>
> [0010] In the IR scheme with stop-and-wait ARQ protocol, a block of information is coded into n packets where n is an integer equal to 2 or greater. Each one of the packets by itself or in combination with another packet or a portion of another packet can be used to decode the original block of information . One or more of the packets are transmitted during a time slot(s) assigned to a particular subscriber. The transmitted packets are received and decoded. If the decoding was successful (i.e., no errors detected or an acceptable number of errors detected), the receiving equipment transmits an ACK (ACKnowledge) message to the transmitting equipment indicating that the information was properly decoded and that a new block of information can be transmitted. If the decoding was unsuccessful (i.e., error detected or an unacceptable number of errors detected), the receiving equipment transmits a NACK (Negative ACKnowledge) which is an indication to the transmitting equipment to retransmit another group of packets (or another single packet) representing the same block of information. The ACK message is

thus an example of a positive confirmation message and the NACK message is an example of a negative confirmation message.

[0017] The stop-and-wait protocol in the prior art is thus a Synchronous Protocol in that the repeat packet transmission are transmitted within a strict timing relationship (defined by the communication system) between transmitting equipment and receiving equipment. Consecutive packet transmissions of the same block of data are separated by a time period usually expressed in terms of number of slots where such time period is constant. In sum, when a transmission is made, an ACK/NACK message indicating a NACK (or ACK) followed by a repeated packet transmission (or a new packet transmission) must be transmitted a certain fixed number of slots later.

From the above portions of Khan, it is apparent that Khan et al., while discussing a new transmission as stated in the Final Rejection, fails to cure the above-noted deficiencies of Ikeda et al. Specifically, Ikeda et al. and Khan et al., considered alone or together, fail to teach or suggest a control signal, which is a different signal from the ACK signal and the NACK signal, pairing with the ACK signal or the NACK signal, for governing operations, which are performed in the terminal apparatus, including a new transmission, a retransmission, and no transmission of a new transmission and a retransmission.

Against dependent claims 21-24 and 31-33, the Final rejection cites col. 1, lines 25-49 of Hershey for a disclosure of an operation wherein the base station resumes a transmission after performing no transmission, the base station performs no transmission and keeps data in a buffer, the base station suspends a transmission and performs no transmission, an a control signal which is a suspend signal for governing operations that the base station suspends a transmission and performs no transmission, or a resume signal for governing operations that the transmitting apparatus resumes a transmission after performing no transmission. The cited portion of Hershey states:

Examples of known ARQ protocols include Stop-and-Wait, Go-Back-N, and Selective

> Repeat. In Stop-and-Wait ARQ, a receiver sends an acknowledge (ACK) message to a transmitter after a given block is received successfully. The transmitter waits until the ACK message is received for a given block before it proceeds with transmitting the next block in a sequence of blocks. If the receiver detects an error in a given block, it sends a negative acknowledgement (NACK) message to the transmitter, and the transmitter then retransmits the given block. In Go-Back-N and Select Repeat ARQ, the transmitter is sending message data and the receiver is sending acknowledgment data simultaneously. After transmitting a given block, the transmitter continues to transmit additional blocks in the sequence even though an ACK has not yet been received for that given block. In Go-Back-N ARQ, if the receiver sends a NACK message indicating that the given block needs to be retransmitted, the transmitter will retransmit the given block and all subsequent blocks that were transmitted prior to receiving the NACK message. In Selective Repeat ARQ, the transmitter retransmits the given block, but then resumes the transmission sequence where it left off prior to receiving the NACK message. A block subsequent to the erroneous block is not retransmitted unless it is specifically identified as erroneous by a NACK message.

However, this portion of Hershey fails to teach or suggest the subject matter of herein amended claims 21 and 31 which recite "said control signal is for governing the operation that the base station apparatus resumes a <u>re</u>transmission after performing no <u>re</u>transmission." This portion of Hershey discloses nothing regarding resumption of a retransmission. Further, regarding claims 22 and 32, Hershey does not teach or suggest performing no transmission and keeping data in a buffer. Regarding claims 23, 24 and 33, Hershey does not teach or suggest suspending a transmission and performing no transmission.

Against dependent claims 25-28, 36 and 37, the Final rejection cites paragraphs [0029] and [0054] of Whitehill et al. as allegedly disclosing (1) a channel quality measurer that measures a channel quality between the terminal apparatus and the base station, wherein the base station transmits the control signal based on the channel quality, (2) a terminal apparatus that performs no transmission and keeps data in a buffer when the channel quality is less than or equal to a threshold and resumes transmission after performing no transmission when the channel quality

becomes greater than the threshold, (3) a base station that transmits a NACK signal when the error detector detects an error for the data and the channel quality is greater than a threshold, transmits the control signal for governing the operations that the terminal apparatus performs no transmission and keeps data in a buffer when said error detector detects an error for the data and the channel quality is equal to or less than the threshold; and transmits the control signal for governing the operation that the terminal apparatus resumes a transmission after performing no transmission when the channel quality become greater than the threshold, (4) a transmitter that transmits a NACK signal when the error detector detects an error for the data and a channel quality measurer determines that the channel quality is greater than a threshold, and (5) a terminal apparatus that performs no transmission and keeps data in a buffer when an error detector detects an error for the data and a channel quality measurer determines that the channel quality is equal to or less than a first threshold and greater than a second threshold, the terminal apparatus resuming a transmission after performing no transmission when the channel quality measurer determines that the channel quality becomes greater than the first threshold, and the terminal apparatus stops and reschedules a transmission after performing no transmission when the channel quality measurer determines that the channel quality becomes equal to or less than the second threshold.

The cited portions of Whitehill et al. merely state:

> [0029] As shown in FIG. 3, each mobile node 102, fixed node 106 or wireless router 107 includes a modem which is essentially a transceiver 108 including a transmitter and a receiver, which collectively can be referred to as a modem, and which are coupled to an antenna 110 and capable of respectively transmitting and receiving signals, such as packetized data signals, under the control of a controller 112. The packetized data signals can include, for example, voice, data or multimedia. Each node 102, 106, 107 further includes a memory 114, which can include a read only memory (ROM) for storing information pertaining to the operation of the node 102, 106, 107 and a random access

memory (RAM) for storing information such as routing table information and the like in accordance with which data packets are transmitted, received and routed by the transceiver 108.

[0054] After successful decoding of an ACK or NACK packet, the source node learns the values of the channel quality information. This channel quality information and the time at which it is received is stored in the ATP-table. If an ACK is received, the message is considered successful; otherwise the message is considered unsuccessful. The success status is also recorded in the ATP-table. Each channel quality measure, combined with the available channel quality history, is compared against a set of thresholds. Based on these thresholds and on the previous transmission parameters, the source node proposes a power level and information rate for the next transmission to the neighbor of interest. The proposed transmission parameters are stored in the ATP-table for use in transmitting the next packet addressed to that destination node.

From the above, it is apparent that Whitehill merely discloses sending channel quality information in an ACK or NACK packet. That is, the channel quality information is sent together with the ACK and NACK. Whitehill does not teach or suggest that the ACK and NACK signals are sent based on channel quality. Whitehill discloses that the power level and information rate for the next transmission is proposed based on the channel quality compared with a threshold. However, Whitehill et al. do not teach or suggest transmission of any control signal based on the channel quality compared with a threshold.

In summary, the Applicants note that Ikeda et al. disclose that NACK indicates that retransmission is required and ACK indicates that retransmission is unnecessary (see paragraphs [0004] and [0020]). Kahn et al. disclose that NACK is an indication to retransmit a packet of the same block and ACK indicates that a new block can be transmitted (see paragraph [0010]). Hershey discloses that a transmitter resumes the transmission sequence where it left off prior to receiving the NACK in the Selective Repeat ARQ (see col. 1, lines 25-49). Whitehill et al. disclose that channel quality information is sent in an ACK or NACK packet (see paragraph

[0053]).

The Office Action takes the position, concerning claims 20, 29, 30, 34 and 35, that the control signal for governing operations of a retransmission corresponds to the NACK of Ikeda et al., the control signal for governing operations of no transmission corresponds to the ACK of Ikeda et al., and the control signal for governing operations of a new transmission in these claims corresponds to the ACK in Kahn et al.

However, the Applicants note that claims 20, 29, 30, 34 and 35 call for transmission of a control signal which is a different signal from the ACK signal and the NACK signal. Ikeda et al. and Kahn et al. do not teach or suggest a control signal different from the ACK and the NACK. Also, claims 20, 29, 30, 34 and 35 define the control signal as governing operations including no transmission of a new transmission and a retransmission. Contrary to the control signal in these claims, the ACK of Ikeda et al. indicates that only retransmission is unnecessary and does not teach or suggest that the ACK indicates that a new transmission is unnecessary (see [0004] and [0020]). In brief, the ACK of Ikeda et al. is merely an indication, which is used in a normal ARQ system, that the received data is successfully decoded, and the ACK of Ikeda et al. is not a control signal for governing operations of no transmission.

The Office Action states, concerning dependent claims 21-24 and 31-33, that the control signal for governing the operation that the base station apparatus resumes a transmission after performing no transmission corresponds to the ACK of Hershey. However, the Applicants note that Hershey, similarly to Ikeda et al. and Kahn et al., does not teach or suggest a control signal which is different signal from the ACK signal and the NACK signal. Also, the control signal in claims 21-24 and 31-33 controls resumption of a retransmission. In contrast, Hershey discloses

only that a transmitter resumes the transmission sequence where it left off prior to receiving the NACK in a Selective Repeat ARQ operation and does not teach or suggest that the transmitter resumes a retransmission after performing no retransmission. In the general Selective Repeat ARQ operation disclosed in Hershey, the transmitter continues (resumes) to transmit additional blocks regardless of whether it receives an ACK or NACK. That is, the transmission in Hershey is resumed regardless of any control signals, and Hershey discloses no event for resuming the transmission. Further, regarding claims 22 and 32, Hershey does not teach or suggest performing no transmission and keeping data in a buffer. Regarding claims 23, 24 and 33, Hershey does not teach or suggest suspending a transmission and performing no transmission.

The Office Action states, concerning dependent claims 25-28, 36 and 37, that Whitehill discloses that the transmitter transmits the control signal based on the channel quality. However, Whitehill discloses only that channel quality information is sent in an ACK or NACK packet, that is, the channel quality information is sent together with the ACK and NACK. Whitehill does not teach or suggest that the ACK and NACK are sent based on channel quality. Whitehill discloses that the power level is proposed based on the channel quality compared with a threshold, but it does not teach or suggest that any control signal is transmitted based on the channel quality compared with a threshold.

Accordingly, it is submitted that even if the teachings of Ikeda et al. and Khan et al. were combined as proposed in the final Rejection, the result still would lack the above-noted subject matter of claims 20, 29, 30, 34 and 35, and thus, claims 20, 29, 30, 34 and 35 are not rendered obvious by these references. Moreover, Whitehill et al. and Hershey do not add anything to the teachings of Ikeda et al. and Khan et al. that would suggest the features of claims 20, 29, 30, 34

and 35. The dependent claims are deemed to be allowable due to their dependence from an allowable independent claim and also due to their recitation of subject matter that provides an independent basis for their individual allowability as discussed above.

Accordingly, it is submitted that this application is in condition for allowance, and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

/James Edward Ledbetter/

James E. Ledbetter
Registration No. 28,732

Date: November 24, 2010
JEL/att
Attorney Docket No. 009289-04193
Dickinson Wright PLLC
1875 Eye Street, NW, Suite 1200
Washington, DC 20006
Telephone: (202) 457-0160
Facsimile: (202) 659-1559

DC 9289-4193 164768